Neutralization in Dynamic Retinoscopy

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by

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Dynamic retinoscopy, briefly defined, is that method of retinoscopy where the accommodation either alone or in association with the convergence is brought into play during the test. There are various ways and means of arousing and varying this accommodative activity and a number of techniques have been developed to meet such special needs. These techniques differ radically in many ways from the technique of static retinoscopy. It is the purpose of this article briefly to sketch one of these points of difference and its significance.

In static retinoscopy, our test ends when neutralization of the light-and-shadow movement is obtained. Some watch for actual neutralization, while others watch for the first light reversal, taking the lens just weaker as the one presumably giving neutralization. Whether we use the one method or the other, we always find that a stronger lens than the one that caused neutralization causes distinct reversal of movements. Thus if an initial "with" movement was neutralized with a plus 2:0 D., a plus 2:25 D. will cause a distinct "against" movement. Or, similarly, if an initial "against" movement was neutralized with a minus 2:0 D., a minus 2:25 D. will cause a distinct "with" movement. We therefore have to deal in static retinoscopy with but one neutralization lens.

It is quite different in dynamic retinoscopy. Here we generally have not one neutralization lens, but a series of such lenses, the lowest powered and the highest powered of this series being conveniently termed the low-neutral and the high-neutral respectively. Between these two we have the neutral range.

The following illustration will explain the foregoing. Say we make a binocular dynamic retinoscopy test by instructing the patient, who is already wearing his statically found correction, to fix binocularly the letters on a small chart attached just above the mirror of the retinoscope. The examiner preferably works along the median line of the patient, holding the retinoscope so that it is equally distant from the two eyes of the patient. From this position the examiner rapidly and alternately "refracts" each eye. The size of the type used on the fixation chart varies with the purpose of the test. This is a feature I shall briefly touch upon in the course of the discussion. Assume the test is made at a distance of 13 inches, necessitating a normal convergence of three binocular metre angles and three dioptres of accommodation.

Suppose we find in our test that the initial movement is "with."
Say, with O. U. plus 1° D. (added to the distance correction) we get neutralization. We proceed with stronger plus lenses and continue to get neutralization until we reach say plus 2°5 D. when we get a definite "against" movement. The first lens that gave neutralization was plus 1°5 D. We now have a low-neutral of plus 1° D., a high-neutral of plus 2°25 D., the strongest lens before reversal, and a neutral range of plus 1°25 D.

What is the significance of the low neutral, the high-neutral and neutral range? This depends upon various factors, viz., age, general vitality, occupation, working habits, refractive error, condition of the ocular muscles, etc. But in general, we can say this. The low-neutral represents accommodative insufficiency. For this "with" movement shows there was not enough accommodation used for the distance of the chart. It took a plus 1° D. to bring up the deficiency of accommodation. This deficiency is not necessarily absolute, rather is it relative to the amount of convergence used, in our illustration three binocular metre angles. The neutral range of 1°25 D. shows either accommodative inefficiency or negative relative accommodation depending upon the size of type used in the test. Where large type is used, such as can be distinguished under a blur of 0°5 D. to 1° D., then the neutral range represents inefficiency of accommodation. This is shown by the tendency of the accommodation to relax and let go as soon as plus power is applied to take its place. The inefficiency may be due to exhaustion incident to general bodily weakness or it may be due to a local condition such as beginning paresis. If the type used in the test is of the very fine variety such as to necessitate exact focussing, then the neutral range represents the negative relative accommodation. This is the amount of accommodation that can be forcibly relaxed with a fixed convergence in the interests of clear and single binocular vision.

When coarse type is used the high-neutral represents the strongest lens aid necessary in order to bring the accommodation and convergence into a comfortable, physiological adjustment. When fine type is used this lens represents the maximum value of the negative relative accommodation at the distance of examination. A small allowance of about 0°5 D. should be made in the above calculations because of a so-called lag of accommodation due, according to Prof. Southall, to the chromatic aberration of the eye. Apart from this allowance it is a matter of judgment to decide whether or not the full value of the high-neutral is to be given as a reading addition in any particular case. But the fact is that the finding of these three values, the low-neutral, the high-neutral and the neutral range will often clear up an obscure case of refraction where the correction based upon static retinoscopy, subjective testing and the subjective determination of the near point proved unsatisfactory.